

Environmental Sustainability: Key to Ensure Sustainable Textile Production

A Discussion Paper



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Introduction

Environmental Sustainability has been one of the key challenges accompanying the growth of the textile industry in India. Challenges facing the textile industry have intensified during the last decade in terms of environmental and social performance. Failure to adhere to environmental norms and build waste disposal mechanisms has led to environmental degradation and threatened the ecological and the socio-economic sustainability of these industries. There is therefore a need for a reference document to develop awareness on environmental issues amongst the key stakeholders and to promote environmentally conducive and economically viable solutions for the sustainability of the textile industry.

This discussion paper seeks to provide technical information and build awareness amongst artisan communities, small and medium industries, and the diverse user groups at the consumer level on the need for environmentally sustainable solutions. Besides providing introductory details of the prescribed environmental standards for air, water, noise and land this brief also provides a brief update on the various activities taken to mitigate the adverse impacts on the environment across various locations, and their efficacy in contributing to the implementation of environmentally conducive production and consumption paradigms. It is our hope that the increased awareness and experience sharing with regards to the environmental compliances and solutions will enable a better replication of best practices in environmental sustainability in the textile sector.

Key Facts

- The Indian textile industry is a significant part of total GDP. Currently, it contributes about 14% to industrial production, 4% to the GDP, and 17% to the country's export earnings. It provides direct employment to over 35 million people¹.
- The textile and clothing industry is a diverse one, both in the raw materials it uses and the techniques it employ. The industry affects the environment adversely at each stage of processing. These impacts on the environment are as numerous as they are varied. Spinning, weaving and industrial manufacture undermine air quality. Dyeing and printing consume vast amounts of water and chemicals, and release numerous volatile agents into the atmosphere that are particularly harmful to our health².

¹Ministry of Textiles, Government of India, Annual Report 2011-2012

²Challa, Lakshmi; Impact of Textile and Clothing Industry on Environment: Approach Towards Eco-friendly Textiles, Dept. of Apparel Technology and Management, Bangalore University



- The textile processing industry is a resource intensive industry particularly with regards to water which is required in large volumes for various unit operations. Such processes also include the use of variety of chemicals. These processes in turn generate a lot of waste which is deleterious to environmental quality.
- Each of the raw materials and processes used in the textile industry has an impact on the surrounding environment. The textile industry, being a resource intensive industry, necessitates the use of high-yielding varieties which mandates the intensive application of the pesticides and chemicals for per-unit production enhancement which in turn has a disastrous impact on wildlife and gets bio-magnified in the food chain. The chemicals used to bleach and colour the textiles, further damage the environment and the health of the people dependent on it.
- Over-usage of natural resources like plants, water, etc further disturbs ecological balance and depletes the already limited resources, besides adding to water, air and noise pollution.
- Sub-standard working conditions in the textile and clothing industry further expose the workers to occupational and health related hazards.
- Discarded clothes further occupy precious space at the landfill sites.

Environmental Impact

Textile processing may be referred to as pollution-intensive industry where every step of each process starting from the production of the raw material to its final processing, releases some or the other kind of pollutant in the surrounding environs most of which are hazardous to environmental and even human health. The form and nature of the pollutants may vary. Pollutants can be liquid, gaseous and solid in form. The nature of the waste generated depends on the type of textile facility, the processes and technologies employed, and the types of fibres and chemicals used. The pollution effecting from the textile industry have been further classified and categorized under the broad categories of Air, Water, Noise and Land pollution³.

Water pollution

Water forms the fundamental resource for the textile industry and is used in high volumes in its operations, from the washing of fibres to bleaching, dyeing and washing of finished products. On an average, approximately 200 litres of water are required to produce 1 kg of textiles. Amongst all the steps involved in textiles processing, wet processing generates the greatest volume of wastewater.

The wastewater generated contain a wide variety of chemicals used in the textile processing, and includes salts, surfactants, ionic metals and their metal complexes, toxic organic chemicals, biocides and anions which substantially enhances the effluent's aquatic toxicity, foaming property and Biochemical Oxygen Demand (BOD)⁴. These chemicals can have harmful effects if not properly treated prior to their discharge into the environment, and thus pose a major challenge in terms of reducing adverse environmental impact of textile industries. The potency and the frequency of these pollutants released by the textile industry far exceed the standard limits prescribed by the Central Pollution Control Board and have been further detailed under the criteria⁵.

³Munde, Ajay: Environmental compliance in Textile Industry, www.fibre2fashion.com

⁴C Parvathi, T Maruthavanan, C Prakash; Environmental impacts of textile industries, The Indian Textile Journal, November 2009

⁵Website of the Central Pollution Control Board - <http://cpcb.nic.in/>

Air pollution⁶

Gaseous emissions form the second significant form of pollution emanating from the textile industry.

Most processes performed in textile mills produce toxic gaseous emissions. Significant sources of air emissions in textile operations include resin finishing and drying operations, printing, dyeing, fabric preparation and effluent treatment plants. Nitrogen and Sulphur oxides are generated from the boilers. Hydrocarbons are emitted from drying ovens and from mineral oils in high-temperature drying/curing. Other harmful chemicals include formaldehyde, acids, softeners and other volatile compounds. Residues from fibre preparation sometimes emit pollutants during the heat-setting processes. Carriers and solvents are emitted during dyeing operations depending on the types of processes used and from wastewater treatment plant operations. Carriers used in batch dyeing of disperse dyes may lead to volatilization of aqueous chemical emulsions during heat setting, drying or curing stages.

Speculation concerning the amounts and types of air pollutants emitted from textile operations has been widespread but usually, air emission data for textile manufacturing operations is not readily available.

Similar to the water pollution emanating from the textile industry, the potency and the frequency of the air pollutants released by the textile industry and their standard limits have been prescribed by the Central Pollution Control Board (CPCB)⁷

Solid waste pollution

Unlike the effluents and hydrocarbons discharged from textile processing which are extremely toxic and hazardous, the primary residual wastes generated from the textile industry are non-toxic. These primary wastes by their sheer bulk and their tendency to accumulate lead to health problems for workers and for communities living adjacent to textile production units. Solid waste includes scraps of fabric and yarn, off-specification yarn and fabric and packaging waste. There are also other wastes associated with the storage and production of yarns and textiles, such as chemical storage drums, cardboard reels for storing fabric and cones used to hold yarns for dyeing and knitting. Cutting room generates a high volume of fabric scraps, which can often be reduced by increasing fabric utilization efficiency in cutting and sewing.

Though the textile industry forms an important industry, it is imperative that its offshoots be adequately analyzed and an understanding developed on their impacts. Section 3 below presents case studies to highlight and develop a better understanding of different kind of adverse environmental impact from textile production and processing activities.

⁶C Parvathi, T Maruthavanan, C Prakash; Environmental impacts of textile industries, The Indian Textile Journal, November 2009

⁷Website of the Central Pollution Control Board - <http://cpcb.nic.in/>

The Legal and Regulatory Framework for Environmental Protection in India

Regulatory Framework for Environmental Protection: An assessment⁸

The Ministry of Environment and Forests (MoEF) is the apex administrative body in the country for regulating and ensuring environmental protection. This Ministry was set up in 1972 as the National Council for Environmental Policy and Planning within the Department of Science and Technology (DST). After the UNs Stockholm Conference in 1976, constitutional sanction was given to environmental concerns through the 42nd Constitutional Amendment, which incorporated the Directive Principles of State Policy and Fundamental Rights and Duties in the constitution. The 1970s saw the formulation of some of the most comprehensive environmental legislations of the country. The MoEF, the Central Pollution Control Board and the State Pollution Control Boards (SPCBs) together form the regulatory and administrative core of the sector⁹.

Chart 1: Envisaged Functions of Pollution Management¹⁰

- Environmental Planning: Including formulation of standards, guidelines, laws, rules and regulations
- Environmental Monitoring: Including Environment Surveillance, Ambient monitoring, and maintaining database
- Environment Impact Assessment/Audit: Including identification and inventory of source of pollutant
- Laboratory Management: Including quality control and Research and Development
- Pollution Control Enforcement (Facility Specific): Including Inspection, Prosecution and Direction
- Technological Intervention: Including design and development of appropriate technologies and their dissemination
- Environmental Awareness/Information: Essentially a main component and includes support to NGO's, Education, Capacity Building and Promoting mass awareness

Existing Schemes and Programmes¹¹

With the strengthened vigour to conserve our environmental resources for meeting not only our present needs but also of our future generations, numerous legislations and sponsored and central sector schemes have been formulated. The major objectives of these schemes are not only to promote and introduce cleaner technologies for resource conservation, but also to ensure environmentally compatible practices for pollution mitigation and abatement through various means such as assessment and monitoring of air and water quality and introduction of technological innovations for the same. (Prevention Control of Pollution) Act, 1981. The present legislative framework is broadly contained in the Environment (Protection) Act, 1986; the Water (Prevention and Control of Pollution) Act, 1974; the Water Cess Act, 1977; and the Air (Prevention Control of Pollution) Act, 1981. The management of forests and biodiversity falls under the ambit of Indian Forest Act, 1927; the Forest (Conservation) Act, 1980; the Wild Life (Protection) Act, 1972 and the Bio-diversity Act, 2002.

⁸Report of the Working Group on Environment & Environmental Regulatory Mechanisms In Environment & Forests for the Eleventh Five Year Plan (2007-2012)

⁹Website of the Ministry of Environment and Forests - <http://envfor.nic.in/>

¹⁰Evaluation of Central Pollution Control Board (CPCB), Indian Institute of Management, Lucknow, February 2010

¹¹Report of the Working Group on Environment & Environmental Regulatory Mechanisms In Environment & Forests for the Eleventh Five Year Plan (2007-2012)

The major initiatives that have been undertaken under the various legislations and schemes on pollution abatement are briefly summarized below:

(i) Central Pollution Control Board

The Central Pollution Control Board (CPCB) was constituted as a statutory body in September, 1974 under the Water (Prevention and Control of Pollution) Act, 1974. CPCB was entrusted with the additional powers and functions under the Air (Prevention and Control of Pollution) Act, 1981 also. It is also a technical advisor to MoEF for implementing the provisions of the Environment (Protection) Act. The principal functions of the CPCB are (i) prevention, control and abatement of water pollution, and (ii) to prevent, control or abate air pollution in the country. Its mandate also includes evaluation of Common Effluent Treatment Plants (CETPs) and programs for environmentally capacity building and awareness. (<http://cpcb.nic.in/>)

(ii) Industrial Pollution Abatement through Preventive Strategies

The scheme consists of three components namely; Environmental Audit, Adoption of Clean Technology in Small Scale Industries and Environmental Statistics. The objective of the scheme is to assist small scale industries in adoption of cleaner production practices and in reduction of waste generation. (www.envfor.nic.in/report/0203/chap-05.doc)

(iii) Establishment of Environment Protection Authorities and Environment Commission and Tribunal

Authorities have been constituted for environmental compliance and enforcement of various activities as per various orders of the Supreme Court. These authorities are-

- National Environmental Appellate Authority (NEAA) under National Environment Appellate Authority Act, 1977 to hear appeal with respect to industries, operations or processes. <http://www.moef.nic.in/legis/others/envapp97.html>
- Environment Pollution (Prevention and Control) Authority (EPCA) for the National Capital Region for compliance relating to environmental standards, emission or discharge of pollutants, steps to control vehicular pollution, restriction of industries etc. <http://www.envfor.nic.in/legis/ncr/ncraauthority.html>

(iv) Assistance for Abatement of Pollution and Environment Policy & Law

This scheme is to strengthen various State Pollution Control Boards (SPCBs) and the State Environment Departments for enforcing the statutory provisions for pollution abatement, upgradation of R&D facilities, capacity building etc. Under the scheme, most of the SPCBs were provided funds for strengthening the laboratories and to undertake various research projects.

(v) Clean Technology

The objective of the scheme is to provide support to introduction of cleaner production and cleaner technologies through setting up of demonstration projects and initiation of relevant R&D activities. <http://moef.nic.in/downloads/public-information/IP-CTF-2011.pdf>

(vi) Creation of Management Structure for Management Substances

Under the scheme, the activities are carried out under three thrust areas namely chemical safety, chemical accident prevention and sound management of hazardous waste and municipal solid wastes. The activities include preparation of emergency plans, setting up of emergency response center, establishment of Common Treatment, Storage and Disposal Facilities (TSDF) for industrial hazardous wastes, preparation of hazardous analysis report, etc. <http://moef.nic.in/divisions/hsmd/hsmd.html>

(vii) Environmental Impact Assessment

Environmental Impact Assessment (EIA) is one of the important management tools for incorporating environmental concerns in the development projects at the planning stage. Environmental clearance is made mandatory since January, 1994 and the environmental clearance process has been further refined. A notification on the same was issued in September, 2006 which replaced the earlier notification of 1994, the major highlight of it being the categorization of developmental activities based on their potential impacts. <http://moef.nic.in/modules/divisions/eia/>

(viii) Common Effluent Treatment Plant (CETP)

The objective of this scheme is to provide financial assistance to the small scale industries in clusters to establish/upgrade Common Effluent Treatment Plants (CETPs) for enabling them to comply with environmental discharge standards. The programme is spread all over the country and the funds from the Centre are routed through respective State Pollution Control Boards. <http://moef.nic.in/divisions/cpoll/cept.pdf>

A policy framework has also been developed to complement the legislative provisions. The Policy Statements for the Abatement of Pollution and the National Conservation Strategy and on Environment and Development (<http://moef.nic.in/mef/policy.htm>) were brought out by the MoEF in 1992, to develop and promote initiatives for the protection and improvement of the environment. The EAP (Environmental Action Programme) was further formulated in 1993 with the objective of improving environmental services and integrating environmental considerations into the development programmes.

Facts from the field: Case studies on the Impact of Textile Industry on Environment

Though there may be regional differences in the manner of production and processing, yet the eventual degrading effects of the industry on the environment as a whole are common across different locations. Traditionally, herbal dyes were used to dye and print fabric in cottage industries. This printing was largely done by hand, mostly in the states of Rajasthan and Gujarat. However, mechanical processing and increased use of chemical dyes is fast replacing the traditional methods. This has further led to an increase in concentration of environmentally deleterious pollutants. Following examples from the field may be the perfect illustration-

- a) **Pali:** Pali, situated on the banks of Bandi River in the state of Rajasthan is one of the major textiles processing hubs and has many tie and dye units. There are approximately 3422 industrial units in Pali District¹². Effluents from textile production are the main sources of water pollution which are discharged into drains. This drains eventually lead into the Bandi River. As a result, physico-chemical parameters including its pungent smell, dark color, high pH of the river have been highly degraded with very low DO, and the high BOD and COD content. The concentrations of total suspended, dissolved and volatile solids, besides phosphates, sulphates, sulphides and chlorides have also substantially increased¹³.

Realizing the urgency to address the situation and in response to the Public Interest Litigations filed by the two industry houses, the Jodhpur bench of the High Court of Rajasthan has ordered the closure of 126 industrial units operating in non-conforming areas in Pali.

¹²www.blacksmithinstitute.org/files/FileUpload/files/India%20Project%20Competition%20Report%20_Jodhpur%20Pali%20Balotra.pdf

¹³Project Completion Report: Multi-stakeholders Consultations for Industrial Waste Management in Jodhpur, Pali & Balotra, Blacksmith Institute, November 2009

- b) **Balotra:** Balotra in Barmer District of Rajasthan state in India, and is located about 100 kms from Jodhpur. The town is famous for hand block printing and textile production units. A majority of the units are cotton textile processing units comprising mainly of dyeing and printing works. Bithuja, 10 Kms west of Balotra city, is the main washing centre for Balotra textile industry, which has been generating large quantity of waste water, leading to extensive pollution in the area. The Rajasthan High Court, while hearing a Public Interest Litigation, had banned discharge of treated industrial effluent into Luni River in Balotra. This order reaffirmed the earlier order of the Rajasthan Pollution Control Board (RPCB) which, while passing an order in 2004, had banned discharge of even the treated effluent into Luni citing it to be detrimental to the groundwater and the ecology of the river due to discharge of thousands of gallons of industrial effluent containing heavy acidic toxins.
- c) **Sanganer:** Sanganer town in Jaipur is famous for its hand block dyeing and textile printing industries. These industries use a variety of chemicals and dyes for the processing and finishing of raw materials. Most of the textile dyes used by these industries have not been evaluated for their impact on health and the environment. Besides being the primary occupational hazard, both the untreated and even treated effluents from these industries are released into surface waters of Amani Shah drainage that seep into the ground water and adjoining water bodies. Many textile dyes are known carcinogens and mutagens¹⁴.

In an important step, a division bench headed by the then Chief Justice Anil Dev Singh had ordered for shifting of the units and imposed heavy fines ranging from Rs. 20,000 to Rs. 10 lakhs depending on the turnover of the unit. The court further directed RIICO to set up a water treatment plant and to relocate the industrial units out of Sanganer division within a period of eight months. This was done in response to a petition filed by a lawyer Vijay Poonia in 1994 alleging that the units came up without prior permission of the government, and lack adequate infrastructure for controlling the discharge which is released without any proper treatment on the land and into the canal constructed by the irrigation department for feeding Newata dam from Sanganer Anicut.

- b) **Vapi:** The Vapi industrial estate in the Valsad district of Gujarat, constitutes around 1500 industrial units mainly comprising of chemicals (inorganic and fine), pesticides, dyes and dyes intermediates, pharmaceuticals, texturing units, plastic processing and paper and pulp. In a report titled 'Performance Status of Common Effluent Treatment Plants in India' published by the Central Pollution Control Board in 2006, it was stated that at the time of inspection of the plant in 2005, the treated effluent was not meeting the standards in terms of BOD, COD, TDS, NH₃-N, SO₄ and Chlorides. Most of the CETPs were commissioned rashly and are found to be non compliant to prescribed norms¹⁵.

The Gujarat Pollution Control Board (GPCB) issued closure notices to 46 industrial units in Vapi and Sarigam in 2011 for not complying with the norms. These were 33 chemical and other units and 13 paper mills. The paper mills were issued notices for dumping hazardous solid waste in their compounds whereas other units were closed down for not following the norms of water and air pollution and not complying with the drawn up action plan.

¹⁴Mathur, Nupur and Bhatnagar, Pradeep: Mutagenicity assessment of textile dyes from Sanganer (Rajasthan), Journal of Environmental Biology, January 2007

¹⁵Common Effluent Treatment Plant: A solution or a problem in itself, Toxics Link, November 2000

Issues and Concerns

Sustainable management and development of environmental resources and their conservation has been a challenge. Uninhibited degradation and pollution of ecological resources has been a major cause of concern, both for the health of human and ecology¹⁶, and is further aggravated by the inefficient and ineffective legislations and their implementation mechanism, some of which are discussed below-

- The report of the Working Group on Environment & Environmental Regulatory Mechanisms in Environment & Forests for the Eleventh Five Year Plan (2007-2012), in its review of the current regulatory framework highlights the inherent inadequacies that are obstructing effective environmental management and planning in the country. Diffused processes and implementation structures present serious challenges to proper implementation. Though the authority to manage and control industrial pollution is vested with the MoEF and respective State Pollution Control Boards, yet few other Ministries and Central Government agencies also contribute either directly or indirectly to the process of determining norms and standards.
- Though the existing environmental legislations are holistic and adequate, yet faulty enforcement has always been a cause of grave concern. One commonly cited reason is the prevailing command and control nature of the environmental regime. Coupled with this is the prevalence of the all-or-nothing approach of the law; they do not consider the extent of violation. Fines are levied on a flat basis and in addition, there are no incentives to lower the discharges below the prescribed levels. The lack of civil administrative authority (particularly, to impose administrative fines) limits the effectiveness of PCBs' enforcement efforts and leads to over-reliance on the judiciary for enforcement. Filing criminal cases against violators in trial courts or reacting to PILs is time-consuming, unpredictable and ineffective.
- There is a lack of regulatory tools and flexibility to provide proportionate enforcement responses with appropriate deterrence against violations that do not have an immediate severe impact on the environment, but represent continuous non-compliance with prescribed regulatory requirements. Available punitive tools for non-compliance have been proved ineffective because procedures are not only rigid and time-consuming but also penalties are too low and fail to consider the full economic and environmental impacts of the violation.
- The Government of India came out with a Policy Statement for Abatement of Pollution in 1992 (<http://moef.nic.in/divisions/cpoll/psap.pdf>), before the Rio conference, which declared that market-based approaches would be considered in controlling pollution. It stated that economic instruments will be investigated to encourage the shift from curative to preventive measures and internalise the costs of pollution and conserve the resources, particularly water. In 1995, the Ministry of Environment and Forests (MoEF) constituted a task force to evaluate market-based instruments, which strongly advocated their use for the abatement of industrial pollution. Various economic incentives have been used to supplement the command-and-control policies. Depreciation allowances, exemptions from excise or customs duty payment, and arrangement of soft loans for the adoption of clean technologies are instances of such incentives. Another aspect that is evident is the shift in the focus from end-of-pipe treatment of pollution to treatment at source.

¹⁶Report of the Sub-group on Environment for 12th Five Year Plan, Ministry of Environment and Forests, October 2011

- A clear commitment is thus required to pursue a development agenda, which is not only environmentally sustainable but is also based on a strategy that preserves and maintains natural resources, and provides equitable access to those who are generally denied. There is a need to have environment protection at the core/centre stage of all policy formulation. Translating the vision of environmental sustainability will require that environmental concerns are given a high priority in development planning at all levels¹⁷.

Deficiencies in the existing schemes

Common Effluent Treatment Plants (CETPs) have demonstrated an immense potential, in solving the water pollution and environmental degradation issues emanating from the indiscriminate disposal of effluents in the surrounding environment. However, the current CETP guidelines during the course of their implementation have also shown certain constraints and operational deficiencies which may be revised for their efficient enforcement. Some of these deficiencies may be enumerated as under-

- Central Pollution Control Board studied the performance of 78 CETPs operating throughout the country during 2002-2005 and published a report – “Performance Status of Common Effluent Treatment Plants in India.” (http://cpcb.nic.in/upload/Publications/Publication_24_PerformanceStatusOfCETPsinIndia.pdf).
- According to this report, the performance of CETPs has been found to be very unsatisfactory, largely because of poor operation and maintenance¹⁸. Achieving standards for treated effluent quality from CETPs is dependent on meeting the designed criteria of inlet quality to the CETPs that inter alia depends on effluent quality from each industry.
- The State Pollution Control Boards are required to prescribe standards for effluent discharge from CETP at each industry and enforce the same.
- There is a need to improve the efficiency and maintenance of assets during the operational stage. Operation and maintenance of STPs and CETPs were found to be weak in terms of managerial, financial and technical aspects. There is also lack of progressive cost-effective technologies to achieve low/zero discharge or recycling of wastewater from industries/ CETPs.
- Treated effluents from estates are conveyed through open nallah or storm water drains, or discharged to rivers and lakes. Due to acute shortage of water in certain areas, it is essential that better methods for disposal be adopted by the industrial estates.

¹⁷Report of the Sub-group on Environment for 12th Five Year Plan, Ministry of Environment and Forests, October 2011

¹⁸Website of the Central Pollution Control Board - <http://cpcb.nic.in/>

Recommendations

Existing environmental legislations need to be amended to include more stringent measures not only to promote conservation, but also to strike a balance between the ecological conservation and economic development. Amendments should seek to set up transparent, socially accountable mechanisms where economic development is at par with ecological sustainability, enabling the realization of the sustainable development in its true essence.

Reforming existing legislations^{19,20}

- Establishing, promoting and causing to establish a transparent audit and monitoring mechanism for assessment and clearance of the environmental projects. This should include a site-conducive qualitative and quantitative environmental audit of the proposed project, setting up region specific environmental standards for mandatory compliance, and an effective clearance mechanism with clearly specified time limits.
- Setting up and promoting efficient e-governance mechanisms for project evaluation and appraisals so as to avoid delays at the Ministry and its regional and subsidiary offices. Adoption of a similar transparent accessible and time-bound IT-based consent management system may also be adopted.
- There exists a stark variance between the standards prescribed at the Central level and the State level. Establishing uniformity in the prescribed standards and procedures advocated for environmental compliance of the proposed projects at the Central and the State levels could be the main tool for ensuring efficacy in project management and implementation. This standardization may also be adopted with regards to the documentation with specific provisions for regional applicability.
- It is necessary that the concept of Public Private Partnership (PPP) be implemented in principle and expeditiously. A callous approach towards PPP has restricted the awareness and knowledge access and has led to a feeling of exclusion amongst the stakeholders. PPP enabling provisions in the existing laws and regulations should be made more interactive. Private sector participation should also be motivated in promoting PPP initiative.
- Opportunities should be explored to undertake thematic research and development for developing and promoting cost-effective and micro-ecologically conducive technologies for environmental protection that also address socio-economic, health and safety needs of the local communities. Schemes for recycling and reuse of treated waste water may also be further promoted. Efforts need to be made to introduce and implement the Zero discharge concept²¹ (as mentioned in many SPCBs Guidelines), which would enhance recycle and reuse of effluent discharge.
- A mechanism to integrate/ convergence for OHS with MoH&FW instead of MoL can be envisaged.

¹⁹Report of the Sub-group on Environment for 12th Five Year Plan, Ministry of Environment and Forests, October 2011

²⁰Report of the Working Group on Environment & Environmental Regulatory Mechanisms In Environment & Forests for the Eleventh Five Year Plan (2007-2012)

²¹A technology of evaporating and drying the effluent For reducing the above BOD, COD level of the effluent, The effluent with initial concentration 4 – 5 % will pass through falling film evaporators and concentrate up to 40 %. Evaporators are designed to reduce foaming and scale formation. Then the concentrate will pass through spray dryer to convert concentrate to dried powder.

- It is to be ensured that the standards and procedures stipulated in the authoritative guidelines must be strictly adhered to. Care may also be taken for efficient implementation along with stringent provisions for any non-compliance. An upward revision in the penalties provided in the E (P) Act, 1986 is required to make them an effective deterrent.
- The necessity of education and awareness of stakeholders on the technical aspects of environmental pollution and its abatement processes and on the existent resource opportunities under various schemes including R&D on low cost technology for resource efficiency and effluent treatment needs to be highlighted. Lack of awareness about the relevant government schemes is an important roadblock in establishing an efficient environmentally conducive regime. For instance, the lack of information on the “Technology Development and Modernisation Fund” and the Integrated Technology Upgradation and Management Programme called “UPTeCH” programmes for technology development, has prevented stakeholders from making full use of these schemes.
- The Working Group on “Effectively Integrating Industrial Growth and Environment Sustainability” for the 12th Five Year Plan (2012-2017) in its report to the Planning Commission has recommended the setting up of 'Green Technology Fund' to promote Green technology upgradation, investments in research and development, and promoting and providing incentives to green entrepreneurs for promoting environmental sustainability. Such kind of initiatives emphasizing on promoting clean technologies and environment friendly products and processes should be promoted and widely disseminated to promote their awareness and enabling utilization of their provisions.
- All key government policies should also have strong component of environmental safeguards and scrutiny. Environmental protection and social development should in fact be part of all ventures of economic progress.

Strengthening regulatory institutions^{22,23}

- CPCB should play a more active role in developing new low cost cleaner technologies as well as in demonstrating such technologies. CPCB should also provide relevant information related to causes of pollution and mechanisms to control pollution to the public and disclose details of polluters publicly.
- CPCB should work more closely with local communities and NGOs for creating awareness and knowledge about pollution abatement and control.
- In order to ensure effective compliance and strict enforcement, the CPCB should formulate comprehensive national policies, procedures (mandatory at least in key aspects), and guidelines for compliance and enforcement (including consent issuance, monitoring, inspections, and sanctions). This should be done in partnership with state boards to ensure uniformity. Such measures would enable SPCBs to increase the efficacy of their activities with regards to their consistency, transparency, effectiveness, and cost efficiency.

²² Evaluation of Central Pollution Control Board (CPCB), Indian Institute of Management, Lucknow, February 2010

²³ Environmental Compliance and Enforcement in India: Rapid Assessment, OECD and AECEN, December 2006

- As strongly advocated by the World Bank in its India Country Environment Analysis²⁴, a whole regulatory package should be put together by the CPCB and SPCBs to target SMEs at the state level and the local levels, including a comprehensive inventory (to identify units that currently operate without consent), simplified monitoring procedure, environmental awareness raising, and technical and financial assistance programs. Close cooperation with industry associations is also essential in developing user-friendly technical guidance documents (and making them available on websites) and setting up economic incentive schemes, based on best practices which already exist in some states.

Revisiting CETPs^{25,26}

- Operation and maintenance of STPs and CETPs need to be strengthened in terms of managerial, financial and technical aspects. Operation of CETPs through a SPV (special purpose vehicle) should be promoted.
- Progressive cost-effective technologies should be promoted to achieve low/zero discharge or recycling of wastewater from industries/ CETPs.
- A mechanism requires to be developed to make these CETPs self sustaining. In this respect, the existing CETPs need to be evaluated and upgraded from time to time. In addition, it is also suggested that efforts may also continue on identification and promotion of pollution prevention technologies in SSIs.
- The existing CETPs should be monitored in accordance with all parameters prescribed by the Central Pollution Control Board. The analyses results should be made public. The management committee should be held liable for any violations of the prescribed standards.
- It should be mandatory for the member units to reveal the information regarding the types of raw materials, its quantity, by-products, production process and the final product. Any industry using hazardous chemicals should be asked to minimize the use and take corrective measures to finally phase out such chemicals.
- Most of these CETPs discharge into the water bodies and land, which is a common property resource. There are many communities which are dependent on these resources for their livelihood, thus making it the fundamental right to know the contamination levels.

²⁴www.worldbank.org.in/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/INDIAEXTN/0,contentMDK:21291199~pagePK:141137~piPK:141127~theSitePK:295584,00.html

²⁵Report of the Sub-group on Environment for 12th Five Year Plan, Ministry of Environment and Forests, October 2011

²⁶Common Effluent Treatment Plant: A solution or a problem in itself, Toxics Link, November 2000

The Way Forward

Environmental protection and social development forms an important component for economic progress. As may be observed from the foregoing discussions, damage to environment is not only a major issue affecting the operational sustainability of the production processes, but also the livelihood sustainability of the dependent artisans and their families. A major bottleneck has been the variations in the compliance norms and their enforcement across different regions, which must be minimized to ensure uniformity and effective implementation. It is thus imperative that -

- Region specific environmental standards are formulated, and a transparent audit and monitoring mechanism for assessment and clearance of the environmental projects be established, with the site-conducive qualitative and quantitative environmental audit of the proposed project.
- Efficient e-governance mechanisms for project evaluation and appraisals are promoted for a transparent accessible and time-bound IT-based consent management system with increased accountability.
- A strong component of environmental safeguards and scrutiny is included in all the policy formulations at the Central and the State government level.

Conclusion

The textile industry forms a very important component of our economy, yet has been in the doldrums given the policy constraints, implementation lacunae and the varying priorities of the stakeholders. It is high time that the value of textile industry as an indispensable resource is realized and steps be taken imperatively for its refurbishment. Numerous steps are being taken in the right direction, and it is our duty to consolidate those steps and add a sustainability factor to it. Environmental sustainability must not be seen as an independent variable, but be perceived as a fundamental fulcrum indispensable to balance and sustain the economic sustainability and consequently the social security.

List of Acronyms

| | |
|----------|--|
| GDP | Gross Domestic Product |
| HF | High Frequency |
| LF | Low Frequency |
| BOD | Biochemical Oxygen Demand |
| COD | Chemical Oxygen Demand |
| DS | Dissolved Solids |
| SS | Suspended Solids |
| SPM | Suspended Particulate Mater |
| RPM | Respirable Particulate Mater |
| MPN | Most Probable Number (used in reference to the bacterial count) |
| DO | Dissolved Oxygen |
| MoEF | Ministry of Environment and Forests |
| pH | Hydrogen Ion Concentration |
| CPCB | Central Pollution Control Board |
| SPCB/s | State Pollution Control Board/s |
| DST | Department of Science and Technology |
| NGO | Non Government Organisaton |
| NEAA | National Environmental Appellate Authority |
| EPCA | Environmental Pollution (Prevention and Control) Control Authority |
| TSDf | Treatment, Storage, and Disposal Facilities |
| EIA | Environmental Impact Assessment |
| EAP | Environmental Action Program |
| MoH&FW | Ministry of Health and Family Welfare |
| MoL | Ministry of Labour |
| E(P) ACT | Environment (Protection) Act, 1986 |
| STP | Secondary Treatment Plant |
| CETP | Common Effluent Treatment Plant |
| RIICO | Rajasthan State Industrial Development and Investment Corporation |

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